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Service Dept.—50 Kamitoda, Toda-shi, Saitama, 335 Japan Tel: 0484-43-1111 Telex: J2962628 CLAFAC-J

clarion Service Manual

Published by Service Administration Section

CONTROL UNIT

BLACK BOX UNIT

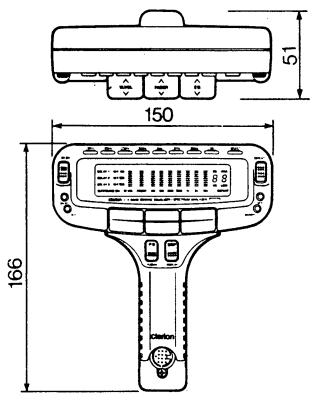
Electronic Equalizer with Surround

Model 720EQ

(EE-726A-51)

■SPECIFICATIONS:

Control frequency:	60Hz/125Hz/250Hz/500Hz /1kHz/3kHz/10kHz
Control range:	±12dB (Each channel)
Frequency response:	20 to 20kHz−1dB
Signal to noise ratio:	85dB
Subwoofer lowpass frequency:	80, 120, 150Hz selectable
Subwoofer line level output:	0 to +10dB adjustable
Power supply voltage:	14.4V (10.8V to 15.6V) Negative ground
Current consumption:	Less than 1A
Input impedance:	10kΩ
Weight:	Black Box Unit: 1.2kg Control Unit: 0.35kg
Dimensions:	Black Box Unit Width 230mm Height 25mm Depth 170mm Control Unit (following fig.) Width 150mm Height 166mm Depth 51mm



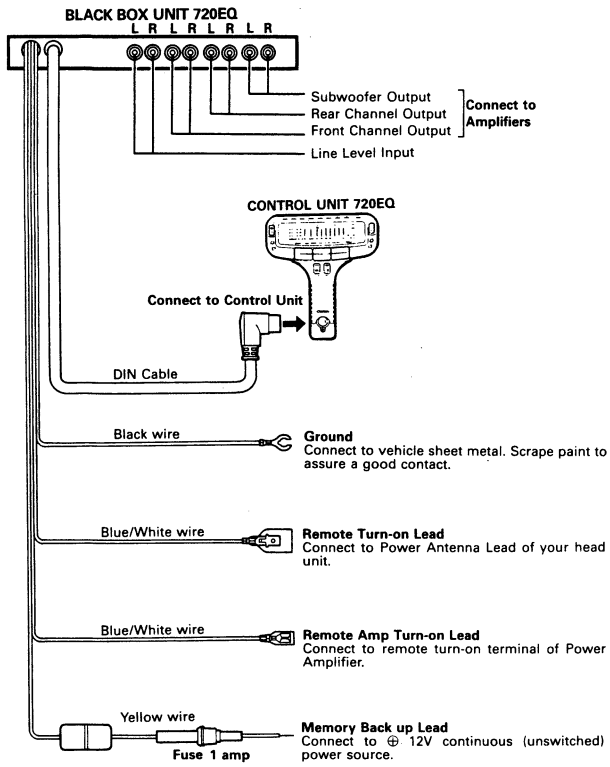
■COMPONENTS:

Control unit		1
Black box unit		1
Flexible arm	948-0190-00	1
Mounting bracket	300-5946-02	1
Mounting bracket	300-5946-03	1
Mounting bracket	300-7520-00	2
Mounting bracket	300-7521-00	2
Parts bag	921-8293-00	1
{ Tap-screw (5x16)	700-5016-80	2
{ Special screw	716-0673-00	4
{ Plate nut	725-0216-00	2
Parts bag	921-8572-00	1
{ Clamper	335-2896-00	3
Parts bag	921-8573-00	1
{ Tap-screw (5x16)	700-5016-89	8
{ Plate nut	725-0216-00	8
{ D-sems-hex-bolt (M4x8)	734-5012-39	2

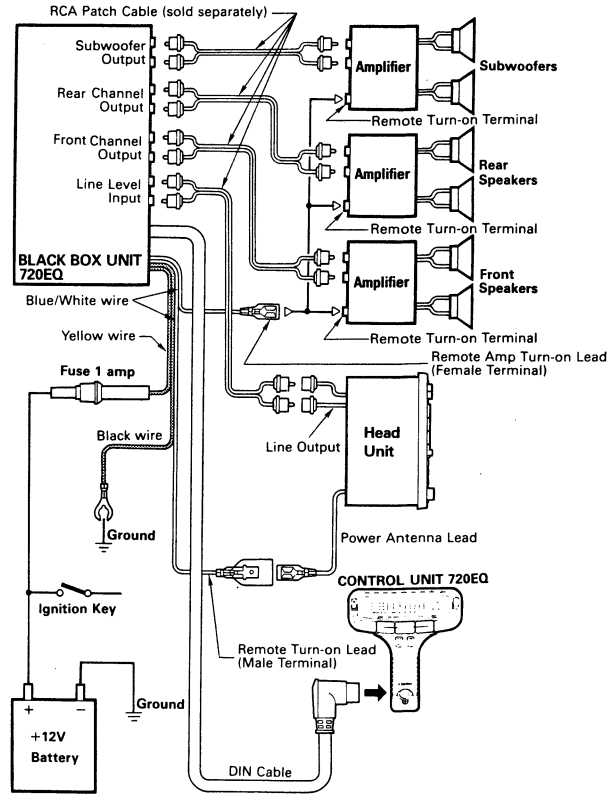
■FEATURES:

- Seven Band Electronic Equalizer
- Seven Band Spectrum Display with Sensitivity Selector
- Equalizer Control Action ±12dB at 60Hz, 125Hz, 250 Hz, 500Hz, 1kHz, 3kHz, 10kHz
- Five Preset EQ Curve Memories with Preset Memory Scan
- Surround Sound System with Delay Time Selector and Front/Rear Channel Delay Selector
- Seven Different Types of Spectrum Display
- Dual Amp Balancer
- RCA Input/Output Connectors
- Selectable Subwoofer Low Pass Frequency
- Adjustable Line Level Subwoofer Output
- Remote Turn-on Circuit
- EQ Defeat Switch
- Dimmer Selector
- Detachable Control Head with Goose Neck Mount
- High Visibility Flourescent Multi-Mode Display
- 1" Height Base Unit

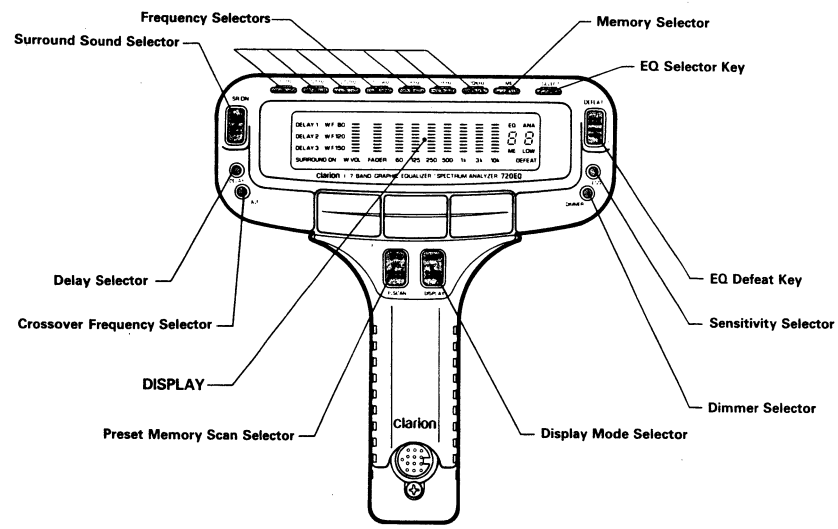
■WIRE CONNECTION:


BLACK BOX UNIT 720EQ
L R L R L R L R
Subwoofer Output
Rear Channel Output
Front Channel Output
Connect to Amplifiers
Line Level Input
CONTROL UNIT 720EQ
Connect to Control Unit
DIN Cable
Black wire
Ground
Connect to vehicle sheet metal. Scrape paint to assure a good contact.
Blue/White wire
Remote Turn-on Lead
Connect to Power Antenna Lead of your head unit.
Blue/White wire
Remote Amp Turn-on Lead
Connect to remote turn-on terminal of Power Amplifier.
Yellow wire
Fuse 1 amp
Memory Back up Lead
Connect to ⊕ 12V continuous (unswitched) power source.

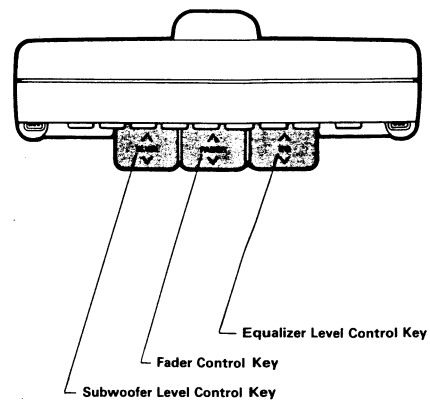
■TYPICAL SYSTEM:



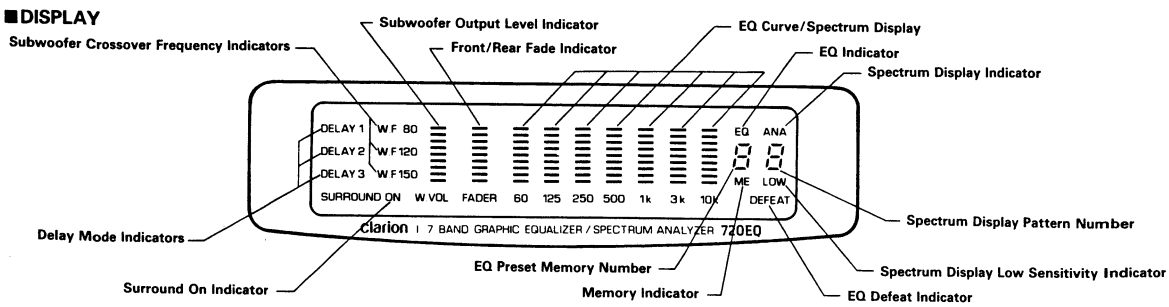
■PART NAMES AND OPERATION:



■UPPER VIEW



■DISPLAY



* **EQ DEFEAT SWITCH**
Press to bypass 7-Band Equalizer. "DEFEAT" will appear in the display. Press again to activate 7-Band Equalizer. "DEFEAT" disappears and "EQ" will appear in the display.

* **SENSITIVITY SELECTOR FOR SPECTRUM DISPLAY**
Press to lower the display sensitivity. "Low" will appear in the display. In the EQ Curve Display mode, defeat (flat) position will be displayed. Press again to return normal sensitivity. "Low" will disappear.

* **DIMMER SELECTOR**
Press to dim the display. Press again to release dimmer.

* **EQUALIZER LEVEL CONTROL KEY**
Press up (or down) to increase (or decrease) the frequency response of the Frequency Selected. Indicator will show the level adjusted. Amber indicator shows flat position.

* **FADER CONTROL KEY**
Press up (or down) to fade front (or rear).
Amber indicator will show center position.
Upper indicator shows FRONT channel fade and lower indicators show REAR channel fade.

* **SUBWOOFER LEVEL CONTROL KEY**
Press up (or down) to increase (or decrease) the subwoofer output level. Indicator on the display will show the level adjusted.

* **DISPLAY MODE SELECTOR**
(See "DISPLAY MODE")
Press to provide various display patterns and EQ CURVE DISPLAY MODE.

* **PRESET MEMORY SCAN SELECTOR**
Press to scan each of the preset memories that you have stored. Each preset memory will be displayed for approximately five seconds and then skip to the next preset memory. Memory preset number indicator will flash in the display. Press again to stop scanning and display the EQ curve that you decide upon.

* **CROSSOVER FREQUENCY SELECTOR FOR SUBWOOFER OUTPUT**
Press to select the crossover frequency from 80Hz, 120Hz or 150Hz for subwoofer output.
"W.F 80, W.F 120 or W.F 150" will appear on the display.

* **DELAY SELECTOR**
Press to select the delay mode from three different times. "DELAY 1, DELAY 2 or DELAY 3" will appear in the display. Only "DELAY" will be displayed when delay is off.

* **SURROUND SOUND SELECTOR**
Press to activate Surround Sound.
"ON" will appear in the display.
Press again to turn off Surround Sound.
"ON" will disappear.

* **FREQUENCY SELECTORS**
Press one of the seven frequency selectors to activate the frequency band that you want to adjust. The selected frequency indicator will flash for TEN seconds. During the TEN seconds you can adjust the level of the selected frequency band by pressing the Equalizer Level Control key up or down.

* **MEMORY SELECTOR**
Press to activate memory mode. "ME" will flash TEN seconds. During the TEN seconds, you can select a preset memory number that you want to store by pressing EQ Preset "Select". Then press "ME" again to store the EQ curve into memory. "ME" will disappear. This may be repeated for up to FIVE preset memories.
Note: Before pressing this Memory Selector, the new EQ curve must be adjusted using the FREQUENCY SELECTOR and EQUALIZER LEVEL CONTROL KEYS.

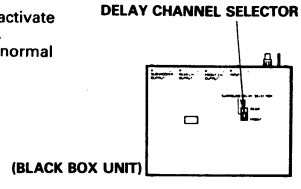
■MEMORY PROCEDURE

1. Select the frequency that you want to adjust using the FREQUENCY SELECTOR.
2. Adjust the level of the frequency using the EQUALIZER LEVEL CONTROL KEY.
3. Repeat 1, 2 for other frequencies.
4. Press MEMORY SELECTOR "ME".
5. Select preset memory number "Select" that you want to store.
6. Press MEMORY SELECTOR "ME" again.

...Repeat 1 thru 6 for Five other memories.

■DELAY CHANNEL SELECTOR (BLACK BOX UNIT)

Set switch to the REAR position to activate delay sound from the REAR channel.
Set switch to the FRONT position to activate delay sound from the FRONT channel.
FRONT position is recommended for a normal system in a car.



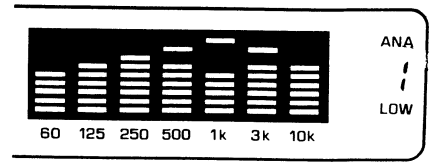
■SURROUND SOUND SYSTEM

This Surround Sound System uses the latest solid state technology to simulate a more realistic sound image in your car.
The following three selectors are provided for the best performance of the Surround Sound System.
..."Surround Sound Selector" activates this function.
..."Delay Selector" is provided for proper delay time in your car.
..."Delay Channel Selector" is provided for selection of Front channel delay or Rear Channel delay.

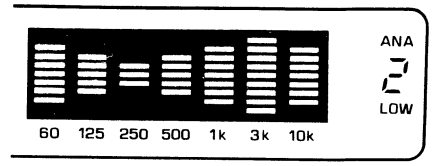
Notes: To get the best surround sound effect, use a DAT, CD or cassette for the music source. When using surround sound and listening to FM stereo in a weak signal area, the music may sound muffled; in this case, turn the surround sound off temporarily.
When you listen to AM with surround Sound, you will hear No sound in this case also turn the surround sound off.

■DISPLAY MODE:

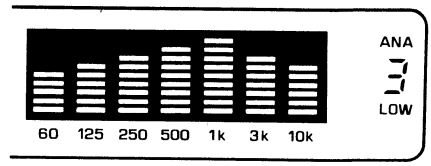
NO.1 PEAK HOLD PATTERN
Peak indication will be held for five seconds when peaks are over the half-way point of the display.



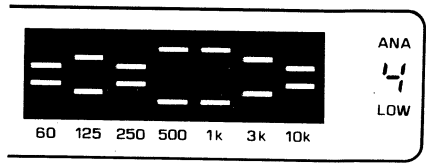
NO.2 CENTER OUT PATTERN
Pattern will be displayed both upper and lower sides from the center out.



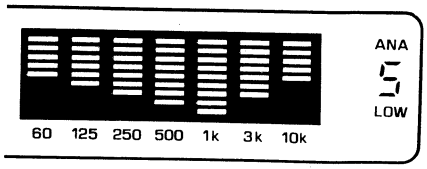
NO.3 SWEEP AND HOLD PATTERN
Every one second, the display will sweep from 60Hz to 10kHz and hold the display for one second.



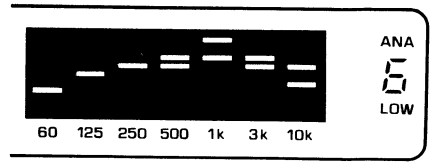
NO.4 OUTLINE PATTERN
The highest level will be displayed both upper and lower sides from the center out.



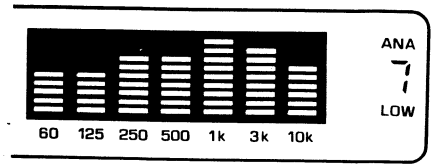
NO.5 REVERSE PATTERN
Signal level will be displayed by extinguishing indicators.



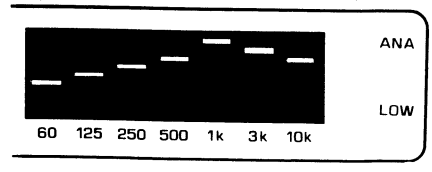
NO.6 OUTLINE AND PEAK HOLD PATTERN
Just highest level will be displayed and held for five seconds.



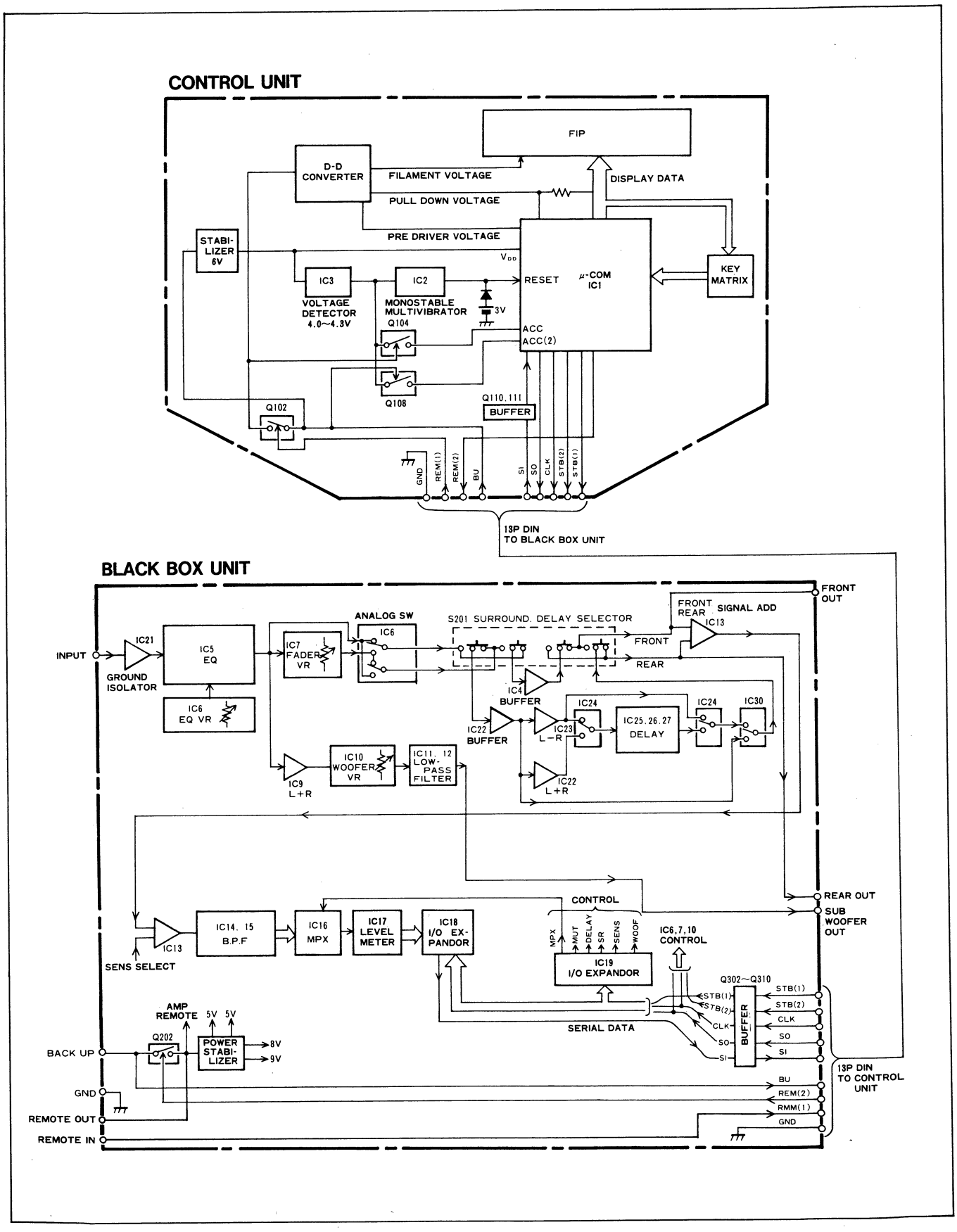
NO.7 SWEEP PATTERN
The display will sweep from 60Hz to 10kHz and display for two seconds.



EQ CURVE DISPLAY MODE
The current EQ Curve will be displayed after the NO. 7 display pattern. In this mode, you can view and select an EQ curve by pressing EQ MEMORY RECALL SELECTOR. Indicator will show the selected memory address in the display.



■BLOCK DIAGRAM:



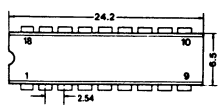
■EXPLANATION OF IC's:

Refer to description in IC service manual vol. 1			
TC4066BP	051-0267-00	Quad Bilateral Switch	P39
μPD4066BG	051-0267-55	Quad Bilateral Switch	P39

Refer to description in IC service manual vol. 2			
7EL-GE-EVOL	051-0621-02	7 Segment Graphic Equalizer	P26
NJM2058D	051-0287-51	Quad Op. Amp.	P41
NJM4558D	051-0422-51	Quad Op. Amp.	P39
TA7424AP	051-0744-02	Ground Isolator	P22
TC4001BP	051-0138-00	Quad 2-Input Positive NOR Gate	P53
TC4051BP	051-0625-00	Single 8-Channel Multiplexer/ Demultiplexer	P54
TC9154AP	051-0628-00	Electronic Volume	P28
TC9187AN	051-0808-01	Electronic Volume for 7 Band Graphic Equalizer	P29
S-8054ALB	051-0821-00	C-MOS Voltage Detector	P51

■LB1410 051-1133-00 LED Level Meter

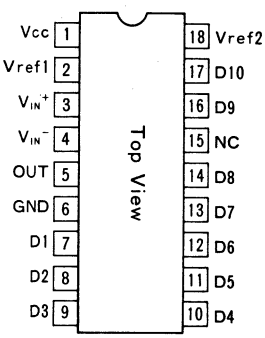
Outward Form



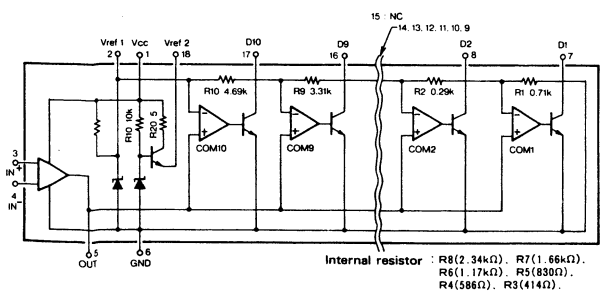
Outline

- Display : An input level is displayed in the form of bar with 10 red and green LEDs.
- Input amplifier : DC amplifier incorporated, which is gain variable through an external resistor.
- Comparator levels : 3dB (−21dB, −18dB, −15dB, −12dB, −9dB, −6dB, −3dB, 0dB, +3dB, +6dB).

Terminal Connection

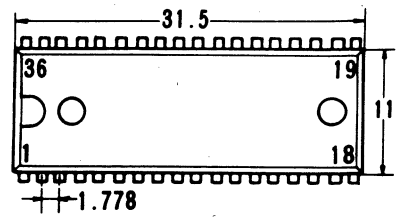


Block Diagram



■M50199P 051-1137-00 Digital Delay

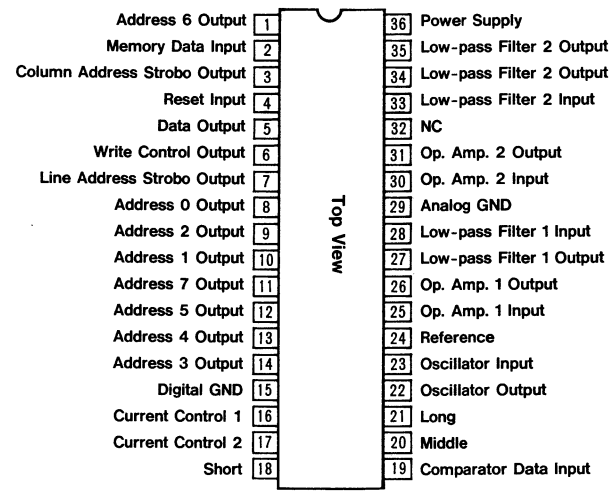
Outward Form



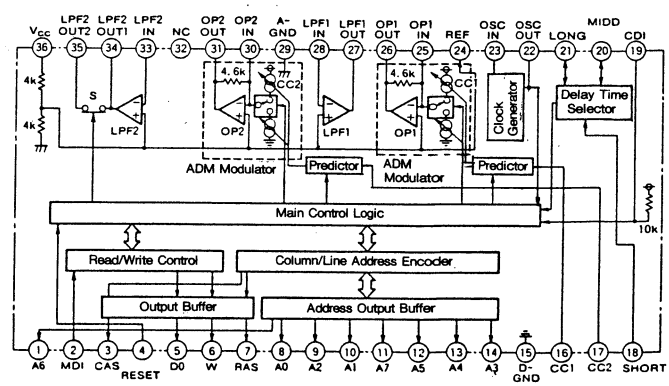
Outline

This is a digital delay IC by silicone gate CMOS process. It uses a digital delay system which stores a digital signal, which was A/D-converted from an input signal once, in the memory IC, D/A-converts the data called from the memory again after a lapse of a certain time and outputs it. Compared with analog delay represented by conventional BBD (Bucket Brickade Device), it provides a long delay with lower noise and distortion factor.

Terminal Connection



Block Diagram

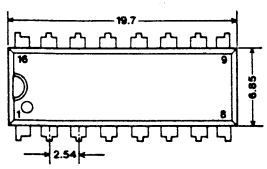


Built-in Function

Name	Symbol	Description
Reference voltage generator	REF	Generates an analog circuit reference voltage (1/2 Vcc) and serves as an operation amplifier bias source.
Low-pass filter (2 pcs.)	LPF1, LPF2	LPF1 eliminates unnecessary high-pass components contained in an input signal to prevent malfunction at A/D conversion. LPF2 eliminates sampled frequency components after D/A conversion.
ADM modulator	OP1, CC1	Digitalizes an input signal in an ADM (Adaptive Delta Modulation) system by the operation amplifier (OP1), current controller (CC1) and external comparator.
ADM demodulator	OP2, CC2	Restores the signal digitalized in the ADM system to an analog signal by the operation amplifier (OP2) and current controller (CC2).
Predictor (2 pcs.)		Operates the ADM modulator optimumly to improve a distortion factor and an S/N ratio.
Clock generator		Generates a master clock for the logic unit. Standard clock frequency fck=3.27 MHz
Delay time selector		Capable of selecting a delay time among SHORT (15 msec.), MIDD (23 msec.) and LONG (30 msec.) by giving "H" to the terminals ⑱, ⑳ and ㉑, respectively.
Switch	S	Turns on at time of SHORT and MIDD.
Main control logic		Comprehensively controls ADM modulation/demodulation, delay time, memory, etc.
Read/write control		Controls memory read/write.
Column/line address encoder		Selects a memory address.
Output buffer, Address output buffer		Drives the external memory IC. (load capacity: 10pF max.)

■MB81256-15P-CD 051-1086-60 262144 Words×1 bit Dynamic RAM

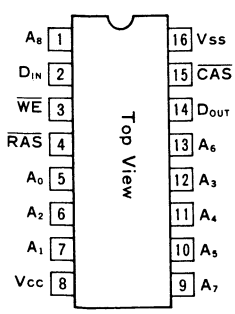
Outward Form



Outline

- Large capacity : 262,144 words x 1 bit
- Power supply : +5V±10%
- Total I/O TTL compatible, low input capacity
- Gated CAS
- 256 refresh cycle/4ms
- Common I/O connectable by early write operation
- $\overline{CAS}$ Before $\overline{RAS}$ Refresh, $\overline{RAS}$ Only Refresh and Hidden Refresh allowed
- Page mode read/modefy/write allowed
- Board bias generator incorporated

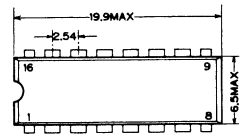
Terminal Connection



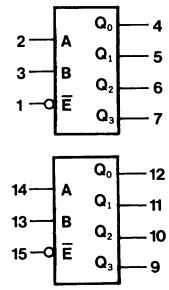
A_0~A_8	Address Input
$\overline{RAS}$	Road Address Strobo
$\overline{CAS}$	Column Address Strobo
$\overline{WE}$	Write Enable
D_{IN}	Data Input
D_{OUT}	Data Output
V_{CC}	Power Supply (+5V)
V_{SS}	Power Supply (0V)

■TC4555BP 051-0320-00 DUAL BINARY TO 1-OF-4 DECODER/DEMULTIPLEXER ("H"-LEVEL)

Outward Form



Block Diagram



V_{DD} ; 16 V_{SS} ; 8

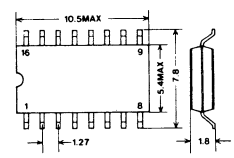
Truth Table

INPUTS			OUTPUTS			
$\overline{E}$	B	A	Q_3	Q_2	Q_1	Q_0
L	L	L	L	L	L	H
L	L	H	L	L	H	L
L	H	L	L	H	L	L
L	H	H	H	L	L	L
H	✱	✱	L	L	L	L

✱ ; Don't care

■TC74HC123F 051-1139-05 DUAL RETRIGGERABLE MONOSTABLE MULTIVIBRATOR

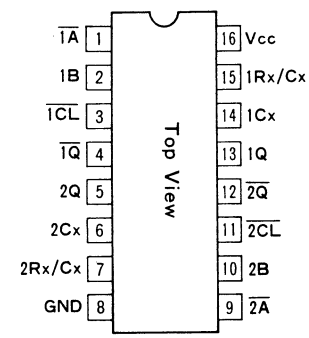
Outward Form



Outline

This IC is a monostable multivibrator which has 2 high-speed CMOS circuits. For trigger inputs, there are $\overline{A}$ input, which triggers at a fall edge, and B input and $\overline{CL}$ input which trigger at a rise edge. As they are all Schmidt trigger inputs, they securely operate even when a rise or fall time is long (t_r=t_f=1s.). Once triggered, an output continues a constant-time single stable mode which is determined by an external resistor and a condenser, as far as the $\overline{CL}$ input is set to "L". If another trigger input is given within a single stable time, that trigger also becomes valid to allow the single stable mode to be maintained.

Terminal Connection



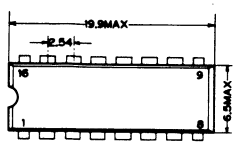
Truth Table

INPUTS			OUTPUTS		NOTE
$\overline{A}$	B	$\overline{CL}$	Q	$\overline{Q}$	
↓	H	H	⎍	⎍	OUTPUT ENABLE
✱	L	H	L	H	INHIBIT
H	✱	H	L	H	INHIBIT
L	↑	H	⎍	⎍	OUTPUT ENABLE
L	H	↓	⎍	⎍	OUTPUT ENABLE
✱	✱	L	L	H	INHIBIT

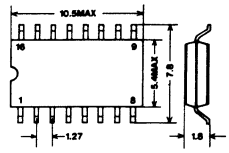
✱ : DON'T CARE

TC9173P 051-0904-00
■TC9174F 051-0828-05 I/O Port Extension Interface IC's
TC9174P 051-0828-00

Outward Form



P type



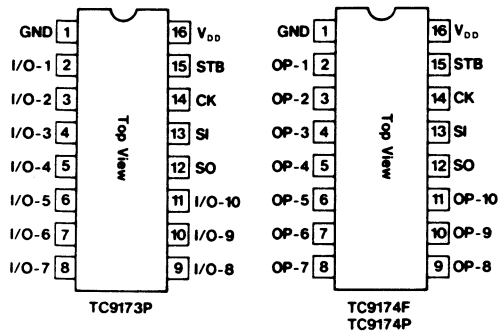
F type

Outline

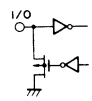
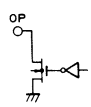
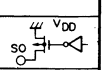
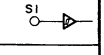
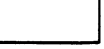
TC9173P and TC9174F.P are I/O port extension interface IC's of a digital tuning system controller LSI.

- TC9173P is for I/O extension, and TC9174F.P is for output only extension.
- Both types have 10 port terminals. TC9173P enables I/O setting bit by bit.
- TC9174F.P can take in output data from an SO terminal to the controller.
- The ports are all controlled by 4 serial path lines on the controller side.

Terminal Connection



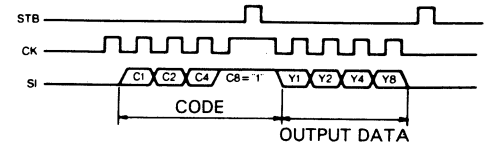
Terminal description

Pin No.	Symbol	Terminal name	Function/Operation	Remarks
2	I/O-1	TC9173P: General purpose I/O ports No. 1 ~ 10	TC9173P: General Purpose I/O Ports I/O setting on a bit-by-bit basis is enabled by a program. • CMOS input upon input • Nch open drain output upon output (large current drive, sink current 10 mA MIN.)	
	OP-1			
3	I/O-2			
	OP-2			
4	I/O-3			
	OP-3			
5	I/O-4			
	OP-4			
6	I/O-5			
	OP-5			
7	I/O-6	TC9174F, P: Enclosed in parentheses are symbol names. General purpose output ports No. 1 ~ 10	TC9174F, P: General purpose output ports Nch open drain output for high-voltage resisting, large-current drive Sink current 10 mA MIN. Voltage resistance 18V MIN.	
	OP-6			
8	I/O-7			
	OP-7			
9	I/O-8			
	OP-8			
10	I/O-9			
	OP-9			
11	I/O-10			
	OP-10			
12	SO	Serial output	Data output ports for serial I/O ports, and Pch open drain output.	
13	SI	Serial input	Data input ports for serial I/O ports, and schmitt input.	
14	CK	Clock signal input	Clock signal input ports for serial I/O ports, schmitt input.	
15	STB	Strobe signal input	Strobe signal input ports for serial I/O ports, and schmitt input.	
16	VDD	Power supply	5 V ± 10% is applied.	
1	GND			

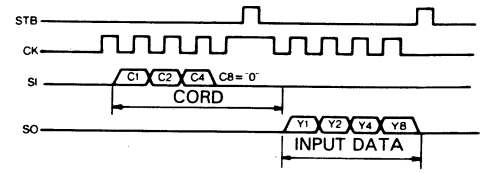
Timing chart

The ports are all controlled by 4 serial path lines (SI, SO, CK and STB) by the controller.

OUTPUT MODE

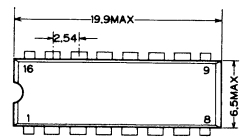


INPUT MODE



■TC9176P 051-1138-00 Electronic Volume

Outward Form

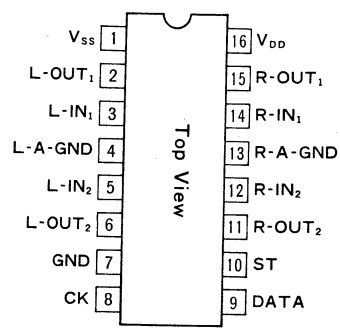


Outline

This IC is an electronic control which can control a volume, balance and loudness by inputting serial data from the external.

- Capable of controlling a volume in 40 steps ranging from 0dB to −76dB every 2dB, and −∞.
- Balancing function also available because 2 channels L and R are incorporated and can be controlled independently.
- Easily interfaced to a microcomputer because both "+" and "−" powers are available and serial data input operates at a logic level of 0 to 5V.

Terminal Connection



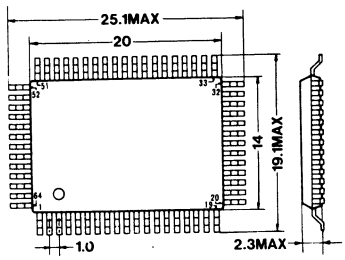
Terminal Function Table

Pin No.	Symbol	Function
2 15	L-OUT1 R-OUT1	Attenuator output at step of 10dB. A signal applied to IN is attenuated at the step of 10dB down to 8 stages in a range between 0 and 70dB.
3 14	L-IN1 R-IN1	Attenuator input at step of 10dB.
4 13	A-GND	AC earth terminal.
5 12	L-IN2 R-IN2	2dB attenuator.
6 11	L-OUT2 R-OUT2	Attenuator output at step of 2dB. A signal applied to IN is attenuated at the step of 2dB down to 5 stages in a range between 0 and 8dB.
9	DATA	Input of attenuation and channel selection data. The data consisting of 20 bits is entered with the CK signal.
8	CK	Clock input. A clock input terminal to receive data from the DATA terminal.

Pin No	Symbol	Function
10	ST	Strobe input. Turning this terminal to the "H" level laps the attenuation and channel selection data received from the DATA and CK terminals. Data remains unchanged unless the terminal is turned to the "H" level.
16 7 1	V_{DD} GND V_{SS}	(+) power terminal. Earth terminal. (−) power terminal.

■μPD75206G-535-1B 051-1056-00 Electronic Equalizer with Surround Subwoofer Controller

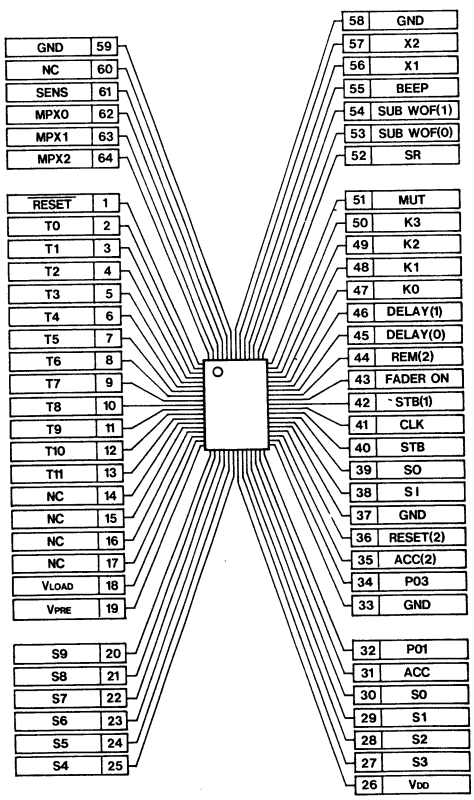
I Outward Form



II Outline

- Displays an EQ curve plus a spectrum analyzer pattern.
- Capable of memorizing the EQ curbe in 5 channels.
- Typical music EQ curve initially memorized in each channel.
- Capable of memorizing the EQ curve at time of set power-off.
- Capable of selecting 9-point/7-point EQ display and fader volume/sub-woofer volume level display.
- Capable of setting sub-woofer frequency enabled/disabled.
- Spectrum analyzer display with peak hold (when 9-point display selected).
- Capable of selecting a DELAY delay amount to 1～3 and OFF.
- Channel-1 to-5 curves scanned at intervals of 3 seconds by the preset scan key.
- Controls an EQ level (TC9187), fader (TC9176) and sub-woofer level (TC9154) with serial data.
- Controls a surround, sub-woofer cut-off frequency, spectrum analyzer sensitivity, etc.
- Directly controls the FIP (fluorescent display tube).

III Terminal Connection



IV Terminal Description

Pin No.	Symbol	Function
1	$\overline{RESET}$	The system is reset when a signal with a constant Low level width is inputted.
2 〜 13	T0 〜 T11	FIP display timing signal output terminal
14 〜 17	NC	Unused.
18	V_{LOAD}	Power terminal to supply power to the pull-down resistor built in as a mask option in the segment and timing output terminal of the FIP control/driver.
19	V_{PRE}	Power terminal to supply power to the predriver of the FIP control/driver.
26	V_{DD}	Power connection terminal.
20 〜 23	S9 〜 S6	Segment driver signal output terminal.
24 25 27 〜 30	S5 S4 S3 〜 S0	Segment driver signal and key scan signal common output terminal.
31	ACC	Turns on/off power.
32	P01	9-point/7-point display selector terminal. Low……9-point display High……7-point display
33	GND	GND.
34	P03	Woofer frequency enable/disable selector terminal. Low……Enabled High……Disabled
35	ACC (2)	When this terminal is set to Low, an interrupt is applied to enter the STOP mode immediately.
36	RESET (2)	When this terminal is set to Low, you are returned to initial setting.
37	GND	GND.
38	SI	Serial data input terminal. (DATA IN) Takes in spectrum analyzer data. (data enabled at Low)
39	SO	Serial data output terminal. (DATA OUT)
40	STB	Serial data strobe output terminal. Strobe output for TC9187 (EQ VOL), TC9154 (woofer VOL) and TC9176 (FADER VOL).
41	CLK	Serial data clock output terminal.
42	STB (1)	Serial data strobe output terminal. Strobe output for extension I/O, TC9173 and TC 9174.
43	FADER ON	This terminal is set to High when outputting fader data.
44	REM (2)	Output terminal to start up power to the main unit.
45 46	DELAY (0) DELAY (1)	DELAY selector parallel port.
47 〜 50	K0 〜 K3	Input terminal for key matrix and data take-in.
51	MUT	Mute selector parallel port. Low : OFF High : ON
52	SR	Surround selector parallel port. Low : OFF High : ON
53 54	SUB WOOFER (0) SUB WOOFER (1)	Sub-woofer selector parallel port.
55	BEEP	Sensor tone output terminal upon key input.
56 57	X1 X2	Crystal oscillator connection terminal. (4.19MHz)
58 59	GND	GND.
60	NC	Unused.
61	SENS	SENS (sensitivity) selector parallel port. High : OFF Low : ON
62 〜 64	MPX0 〜 MPX2	Multiplexer selector parallel port.

V Key Matrix Table

Key In \ Key Out	S0 (30pin)	S1 (29pin)	S2 (28pin)	S3 (27pin)	S4 (25pin)	S5 (24pin)
K3 (50pin)	WOF UP	SR	P.SCAN	DISP	10kHz	EQ UP
K2 (49pin)	WOF DOWN	FAD UP	MEMO	60Hz	3kHz	EQ DOWN
K1 (48pin)	WOF F	FAD DOWN	SELECT	125Hz	1kHz	DIMMER
K0 (47pin)	DELAY	SENS	DEFEAT	250Hz	500Hz	——

*All are momentary switches.

VI Key Function

Key Name	Function
WOF UP	Key to directly ups/downs a sub-woofer volume.
WOF DOWN	
WOF F	Sub-woofer cut-off frequency selector key. Every time this key is pressed, 80Hz, 120Hz and 150Hz are selected in turns.
DELAY	Delay selector key. Every time this key is pressed, DELAY1, DELAY2, DELAY3 and DELAY OFF are selected in turns.
SR	Surround on/off selector key.
FAD UP	Key to directly ups/downs a fader volume.
FAD DOWN	
SENS	Key to select display sensitivity in the spectrum analyzer mode.
P.SCAN	When this key is pressed, a channel is called at intervals of 3 seconds out of the equalizer of the next channel.
MEMO	Key to memorize in case of pattern 0 equalizer curve. Press this key, select the channel desired to memorize with the channel selector key, and press this key again. The channel is memorized.
SELECT	EQ channel (channels 1~5) call key. Calls the equalizer curve of the next channel.
DEFEAT	DEFEAT ON/OFF selector key.
DISP	Spectrum analyzer selector key. Capable of selecting patterns 0~7.
60Hz ↕ 10kHz	Equalizer curve change key. Pressing this key enables that frequency characteristic to be changed. Thereafter, change the characteristic with the EQ UP/DOWN key. It is also possible to press the MEMO key in this mode to memorize.
EQ UP	If this key is pressed in a frequency mode, the EQ level of that frequency can be changed.
EQ DOWN	
DIMMER	Display illuminance selector key. Selects illuminance in 2 steps.

■PARTS LIST:

◎Electrical section

◎CONTROL UNIT SECTION ( )……INTERCHANGEABILITY

REF.NO.	PART NO.	DESCRIPTION	Q'TY
D109	001-0163-30	Diode RD30E-B	1
D114	001-0163-31	Diode RD33E-B	1
D101~103 105,106	001-0330-00	Diode 1SS119-14	5
	(001-0352-00)	Diode (1SS176)	
D110 117~122	001-0343-00	Diode 1SS131	7
	(001-0352-01)	Diode (1SS178)	
D110	001-0360-00	Diode S5566B	1
	(001-0447-00)	Diode (DSF10B)	
D130	001-0361-10	Diode 1SS198	1
D115	001-0377-32	Diode MA4056M	1
	(001-0376-32)	Diode (MTZ5.6JB)	
	(001-0400-32)	Diode (HZS5.6JB2)	
D107	001-0377-43	Diode MA4082L	1
	(001-0376-44)	Diode (MTZ8.2JB)	
	(001-0400-43)	Diode (HZS8.2JB1)	
D104	001-0400-37	Diode HZS6.8JB1	1
	(001-0377-37)	Diode (MA4068L)	
D116	001-0423-16	Diode MA4043	1
	(001-0425-17)	Diode (HZS4.7E)	
D108	001-0454-00	Diode MA700	1
D112	001-0479-00	Diode HSS81	1
D123~127	001-0483-03	LED LT8S257 (Orange)	5
T101	007-1106-00	Output trans	1
L101	010-1970-00	Coil	1
S 103,106 110~112 114 116~124	013-3741-01	Switch	15
S 102,104,105 107,108,109 113,115	013-3812-01	Switch	8
S100	013-3868-00	Switch	1
PL101~106	017-0372-00	Pilot lamp 16V40mA	6
CCT101	050-0093-06	Component circuit	1
	(050-0093-66)	Component circuit	
IC3	051-0821-00	IC S-8054ALB	1
IC1	051-1056-00	IC μPD75206G-535-1B	1
IC2	051-1139-05	IC TC74HC123F	1
	(051-1139-65)	IC (HD74HC123AFP)	
BEEP	060-0102-00	Buzzer	1
X100	060-0130-01	Ceramic resonator 4.19MHz	1
BATT.	088-0017-01	Battery 3V	1
Q102	100-0950-00	Transistor 2SA950-O,Y	1
Q104,108	100-1346-00	Transistor 2SA1346	2
Q 101,103 105 109~111	102-2458-00	Transistor 2SC2458-O,Y,GR,BL	6
	(102-2785-00)	Transistor (2SC2785-RJHFEK)	
	(102-3330-00)	Transistor (2SC3330-RSTUV)	
Q107	102-3668-00	Transistor 2SC3668-O,Y	1
C109	171-1022-06	Ceramic capacitor 1000pF SC	1
C103,105	171-1032-06	Ceramic capacitor 0.01μF SC	2
C108	171-1522-06	Ceramic capacitor 1500pF SC	1
C104	171-1532-06	Ceramic capacitor 0.015μF SC	1

REF.NO.	PART NO.	DESCRIPTION	Q'TY
C106	171-3322-06	Ceramic capacitor 3300pF SC	1
C110	042-0371-00	Electrolytic capacitor 63V47μF	1
C102	179-2273-23	Electrolytic capacitor 10V220μF S	1

REF.NO.	PART NO.	DESCRIPTION	Q'TY
C107	179-2273-48	Electrolytic capacitor 25V220μF S	1
C101	182-1073-22	Electrolytic capacitor 10V100μF SS	1
FIP	379-0221-00	Indicator	1

◎BLACK BOX UNIT SECTION

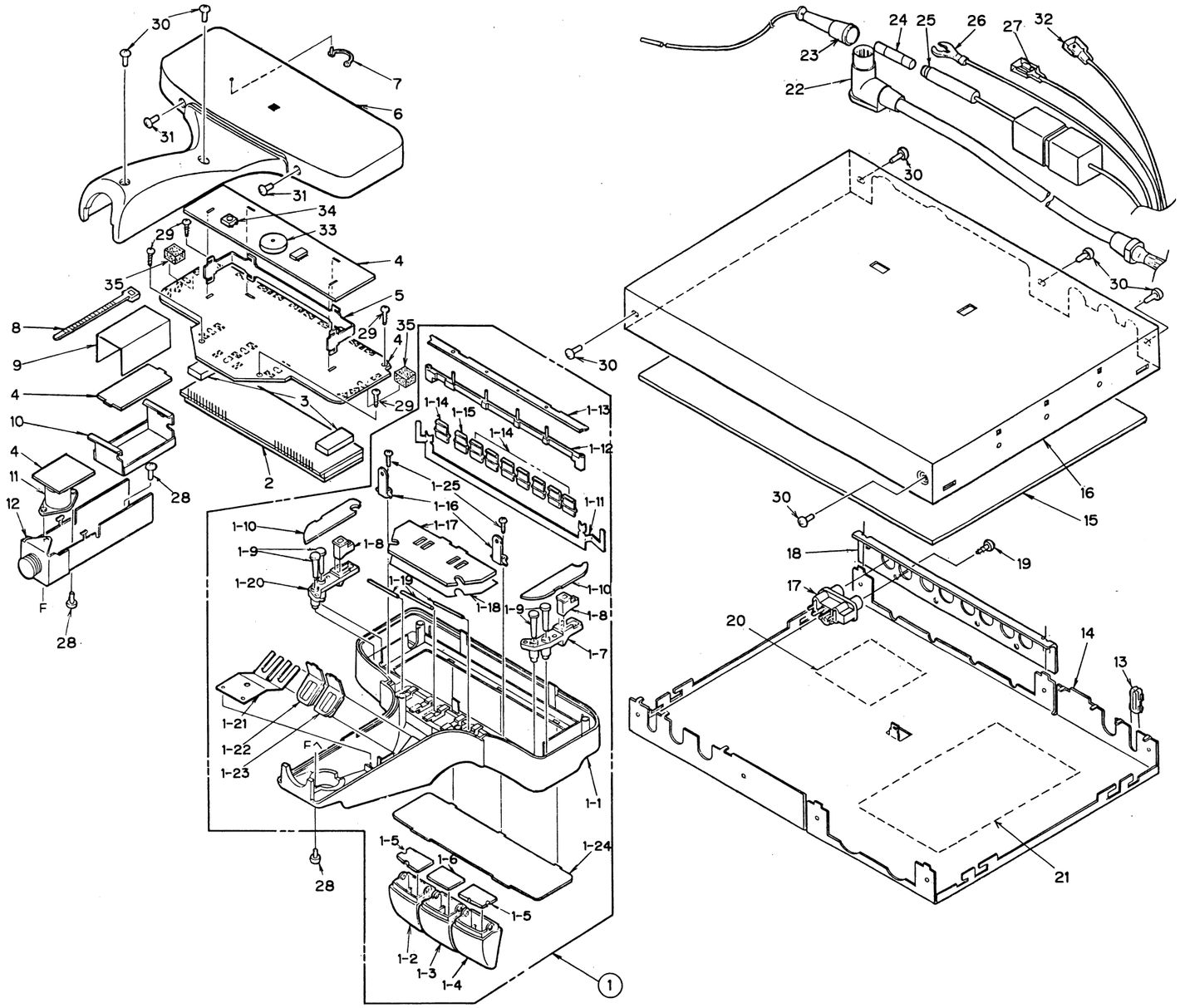
REF.NO.	PART NO.	DESCRIPTION	Q'TY
D210~212	001-0330-00 (001-0352-00)	Diode 1SS119-14 Diode (1SS176)	3
D203	001-0360-00	Diode S5566B	1
D301~314 403,404	001-0361-10	Diode 1SS198	16
D209,214,215	001-0366-00	Diode LTZ-MR15	3
D205	001-0400-48 (001-0376-49) (001-0377-48)	Diode HZS9.1JB3 Diode (MTZ10JA) Diode (MA4091H)	1
D204,401,402	001-0425-19 (001-0423-19) (001-0421-19)	Diode HZS5.6J Diode (MA4056) Diode (MTZ5.6J)	3
D208	001-0425-23 (001-0421-23) (001-0423-23)	Diode HZS8.2J Diode (MTZ8.2J) Diode (MA4082)	1
S201	013-3867-00	Switch	1
CCT302	050-0088-63 (050-0088-03)	Component circuit 10kΩx7 Component circuit (10kΩx7)	1
CCT301	050-0088-65	Component circuit 1.5kΩx7	1
CCT303	050-0091-00	Component circuit 100kΩx3	1
CCT305	050-0096-00	Component circuit 10kΩx9	1
CCT304	050-0096-01	Component circuit 100kΩx9	1
IC29	051-0138-00 (051-0138-60)	IC TC4001BP IC (HD14001BP)	1
IC11,24,30	051-0267-00 (051-0267-80) (051-0267-50)	IC TC4066BP IC (MB84066BM) IC (μPD4066BC)	3
IC20	051-0267-55	IC μPD4066BG	1
IC4,8,9,14,15 22	051-0287-51	IC NJM2058D	6
IC28	051-0320-00	IC TC4555BP	1
IC12,13,23	051-0422-51 (051-0422-52)	IC NJM4558D IC (LA6458D)	3
IC25	051-0430-00	IC μPC393C	1
IC5	051-0621-02	IC 7EL-GE-EVOL	1
IC16	051-0625-00 (051-0625-60)	IC TC4051BP IC (HD14051BP)	1
IC10	051-0628-00	IC TC9154P	1
IC21	051-0744-02	IC TA7424AP	1
IC6	051-0808-01	IC TC9187AN	1
IC19	051-0828-00	IC TC9174P	1
IC18	051-0904-00	IC TC9173P	1
IC27	051-1086-60	IC MB81256-15P-CD	1
IC17	051-1133-00	IC LB1410	1
IC26	051-1137-00	IC M50199P	1

REF.NO.	PART NO.	DESCRIPTION	Q'TY
IC7	051-1138-00	IC TC9176P	1
X401	060-0176-50	Ceramic resonator 3.58MHz	1
Q202	100-0950-00 (100-0952-00)	Transistor 2SA950-O,Y Transistor (2SA952-MLK)	1
Q403	100-1346-00	Transistor 2SA1346	1
203,204 206~208 Q214 301~310 401	102-2458-00 (102-2785-00) (102-3330-00)	Transistor 2SC2458-O,Y,GR,BL Transistor (2SC2785-RJHFEK) Transistor (2SC3330-RSTUV)	17
Q201,205	102-2655-00	Transistor 2SC2655-O,Y	2
Q402	103-1225-00	Transistor 2SD1225-MPQR	1
Q209~213	103-1504-00 (103-1450-00)	Transistor 2SD1504-D,E Transistor (2SD1450-RST)	5
C425	160-1012-05	Ceramic capacitor 100pF HD	1
C414,421	160-6812-05	Ceramic capacitor 680pF HD	2
222,226 C234~237 249,332,419	171-1032-06	Ceramic capacitor 0.01μF SC	9
C315,316	171-1522-06	Ceramic capacitor 1500pF SC	2
C311,312	171-1532-06	Ceramic capacitor 0.015μF SC	2
C412	171-2222-06	Ceramic capacitor 2200pF SC	1
C309,310	171-2732-06	Ceramic capacitor 0.027μF SC	2
C418	171-3922-06	Ceramic capacitor 3900pF SC	1
C313,314	171-4722-06	Ceramic capacitor 4700pF SC	2
C224,417,422 427,428	171-4732-06	Ceramic capacitor 0.047μF SC	5
C252,307,308	171-5632-06	Ceramic capacitor 0.056μF SC	3
C223	173-1041-10	Polyester capacitor 0.1μF S	1
201,202,245 C250,251,331 416,424	179-1053-62	Electrolytic capacitor 50V1μF S	8
C317~330	179-1063-32	Electrolytic capacitor 16V10μF S	14
203 C205~207 228,242,246 408,411,426	179-1073-22	Electrolytic capacitor 10V100μF S	10
C254	179-1073-32	Electrolytic capacitor 16V100μF S	1
C243	179-1073-33	Electrolytic capacitor 16V100μF S	1
C208,209	179-2253-62	Electrolytic capacitor 50V2.2μF S	2
C253	179-2273-23	Electrolytic capacitor 10V220μF S	1
C244	179-3373-33	Electrolytic capacitor 16V330μF S	1
210~221 225 230~233 238~241 C255,256,301 302 401~407 413,415,420	179-4753-62	Electrolytic capacitor 50V4.7μF S	35
204,229,247 C248,409,410 423	179-4763-32	Electrolytic capacitor 16V47μF S	7
C305,306	182-1043-62	Electrolytic capacitor 50V0.1μF SS	2
C303,304	182-2243-62	Electrolytic capacitor 50V0.22μF SS	2

NOTE : OM (Oxidized Metal) SS (Super Small)
S (Small) TC (Temperature-Compensating)
HD (Higher Dielectric) LL (Low Leak)
SC (Semi-Conductor) USS (Ultra Super Small)

■EXPLODED VIEW • PARTS LIST:

◎Main section



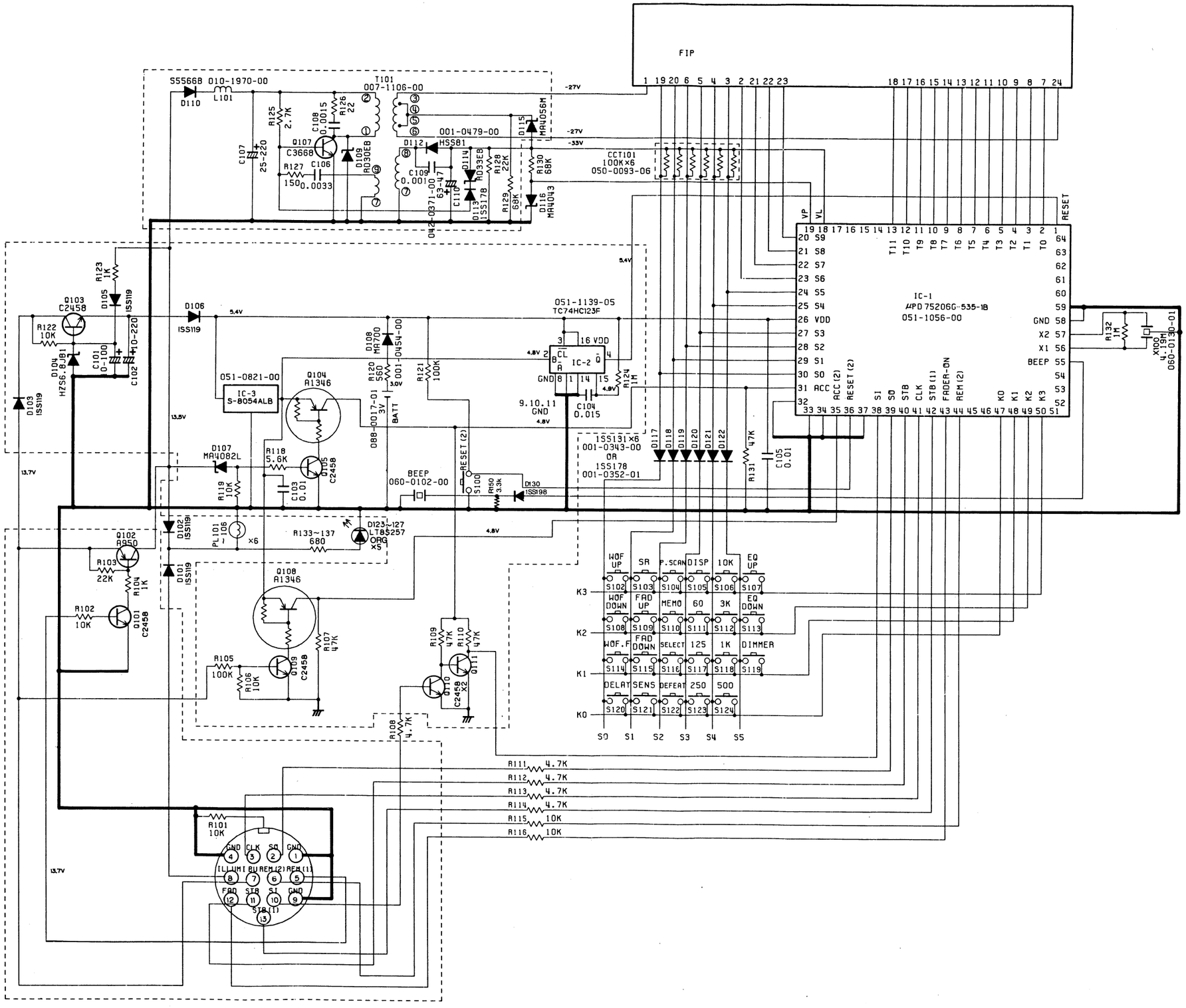
REF.NO.	PART NO.	DESCRIPTION	Q'TY
1	940-3000-01	Escutcheon ass'y	1
1-1	370-5059-01	Escutcheon (Front)	1
1-2	382-1658-00	Button (EQ)	1
1-3	382-1663-00	Button (FADER)	1
1-4	382-1662-00	Button (W.VOL)	1

REF.NO.	PART NO.	DESCRIPTION	Q'TY
1-5	345-6874-00	Rubber sheet (W.VOL/EQ)	2
1-6	345-6873-00	Rubber sheet (FADER)	1
1-7	335-2898-00	Illumi. plate (L)	1
1-8	382-1665-00	Button (SR ON/DEFEAT)	2
1-9	382-1660-00	Button (SENS/DIMMER/DELAY/W.F)	4

REF.NO.	PART NO.	DESCRIPTION	Q'TY
1-10	345-6872-00	Rubber sheet	1
1-11	330-8982-00	Button plate	1
1-12	335-2899-00	Illumi. plate (P)	1
1-13	345-6871-00	Rubber sheet	1
1-14	382-1661-00	Button (60～10kHz/SELECT)	8
1-15	382-1661-01	Button (ME)	1
1-16	330-8980-00	Shaft stopper	2
1-17	345-6875-00	Rubber sheet	1
1-18	347-2784-01	Conductor	1
1-19	754-0016-00	Button shaft	3
1-20	335-2897-00	Illumi. plate (R)	1
1-21	750-2712-00	Spring	1
1-22	382-1684-00	Button (DISP)	1
1-23	382-1683-00	Button (PS)	1
1-24	373-0533-03	Dial cover	1
1-25	702-2006-81	Tap screw (2x6)	2
2	379-0221-00	Indicator	1
3	345-4878-00	FL Rubber	2
4	099-8432-00	P.W.B	1
5	330-8998-00	P.W.B joint	1
6	370-5060-01	Escutcheon (Rear)	1
7	382-1707-00	Button (RESET)	1
8	335-0833-01	Lead holder	1
9	347-2760-00	Insulator	1
10	330-8952-00	Shield plate	1
11	074-0865-00	Outlet socket (13P)	1
12	330-8951-00	Grip frame	1
13	335-0580-00	Lead holder	1
14	311-1319-01	Lower case	1
15	099-8433-00	P.W.B	1
16	310-1363-01	Upper case	1
17	075-0283-00	Jack	4
18	330-8987-00	Connector bracket	1
19	702-3008-80	Tap screw (3x8)	4
20	286-7103-00	Set plate	1
21	285-1363-00	Guide label	1
22	854-0789-00	Extension lead (13P)	1
23	850-2496-00	A-lead	1
24	120-0010-00	Fuse (1A)	1
25	850-2495-01	A-lead	1
26	840-0345-02	Bonding wire	1
27	850-2492-00	A-lead	1
28	714-3006-89	Machine screw (M3x6)	3
29	702-2008-81	Tap screw (2x8)	4
30	731-3006-89	Tap tight (3x6)	7
31	714-2605-89	Machine screw (M2.6x5)	2
32	850-2491-00	A-lead	1
33	060-0102-00	Buzzer	1
34	013-3868-00	Switch (RESET)	1
35	345-4906-00	Cushion	2

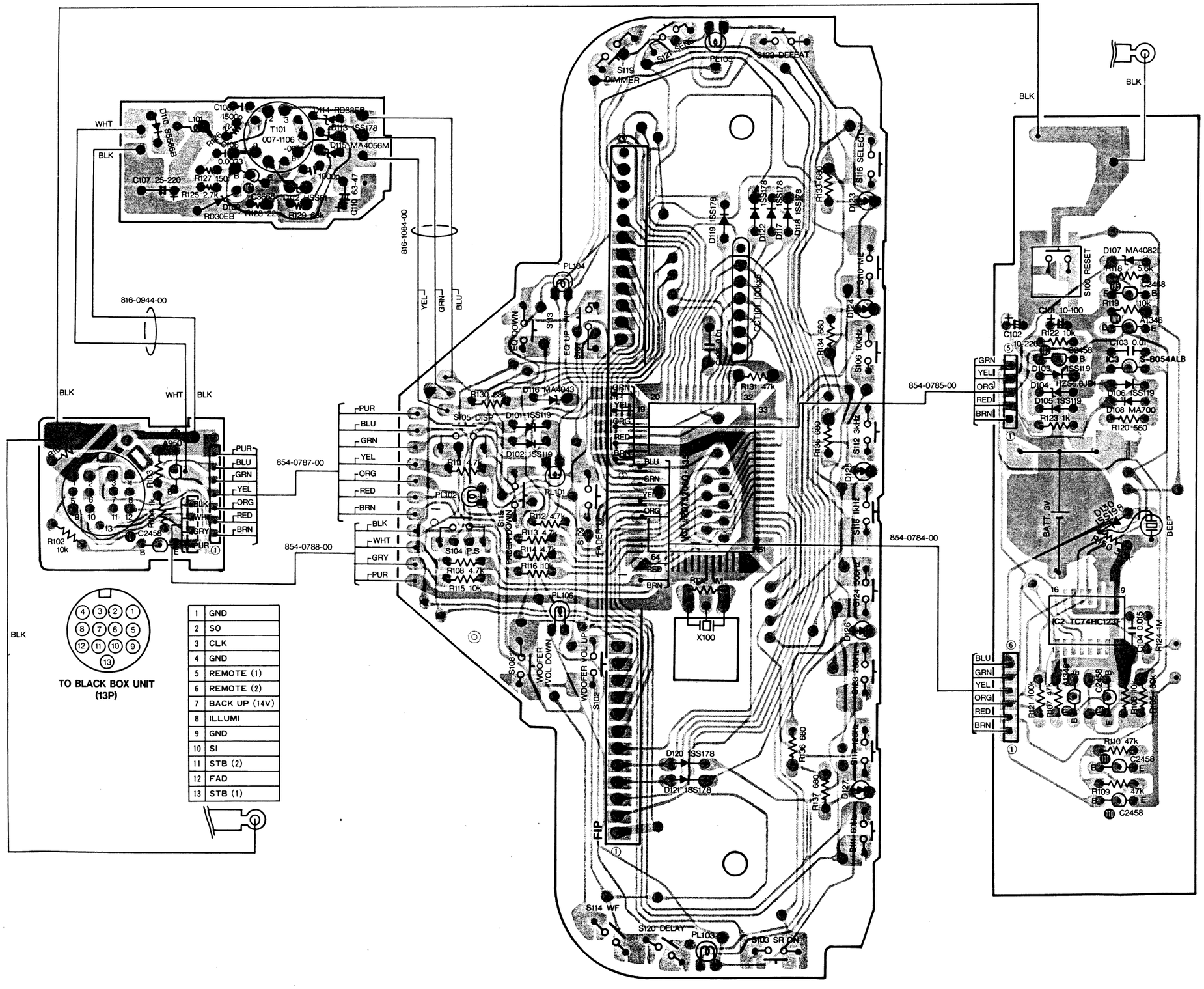
■CIRCUIT DIAGRAM:

◎CONTROL UNIT SECTION



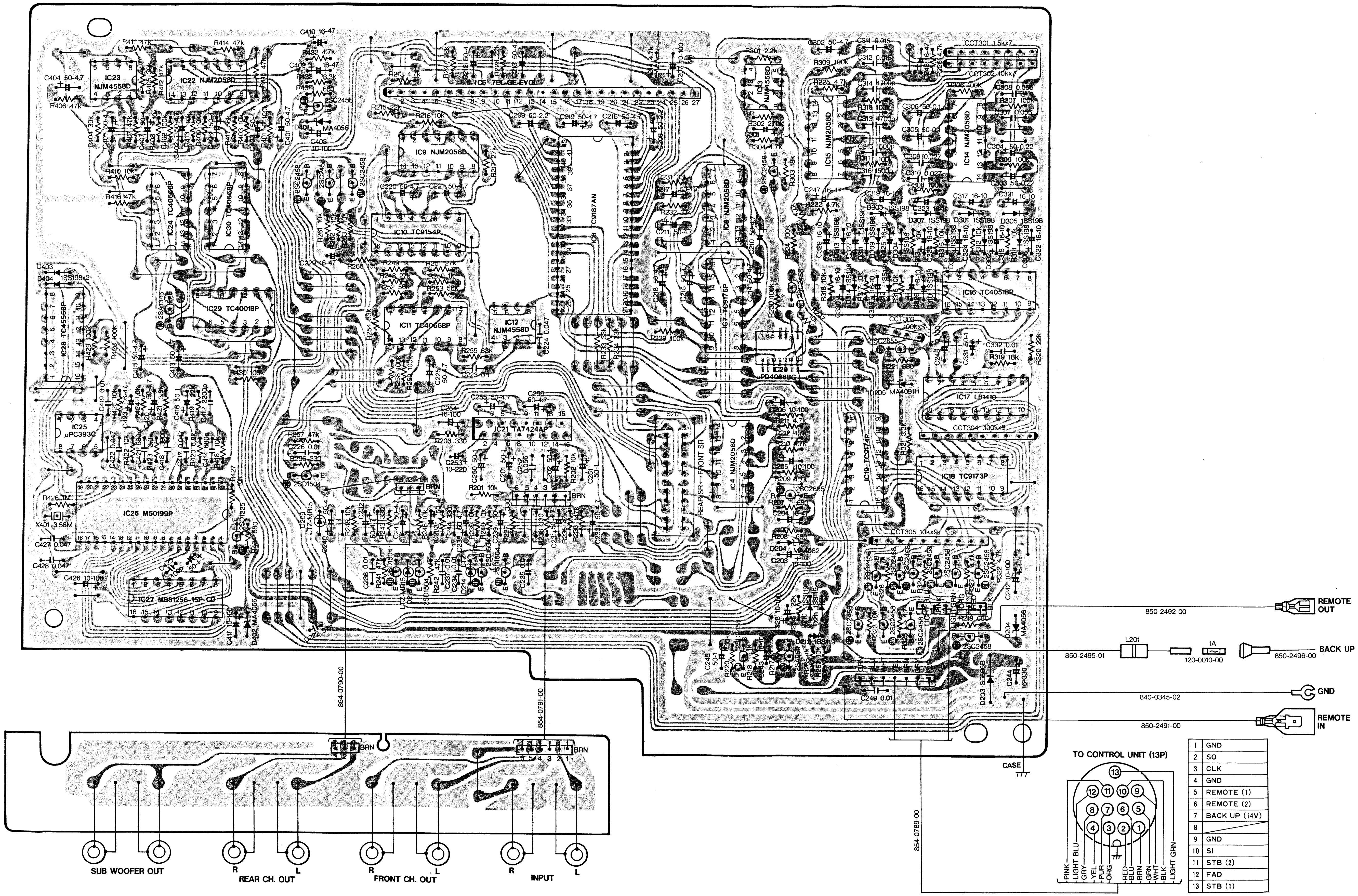
■PRINTED WIRING BOARD:

◎CONTROL UNIT SECTION



■PRINTED WIRING BOARD:

◎BLACK BOX UNIT SECTION

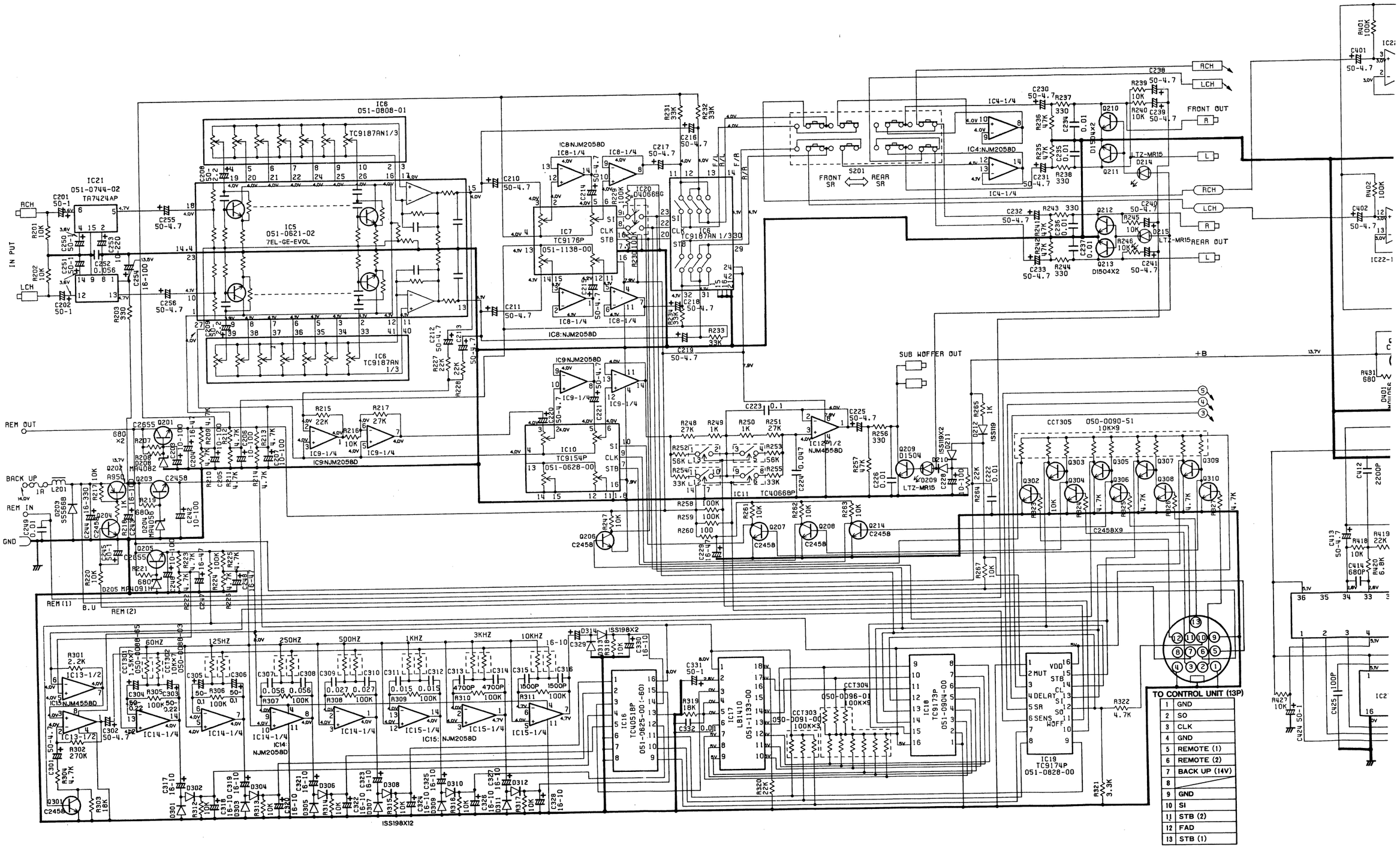


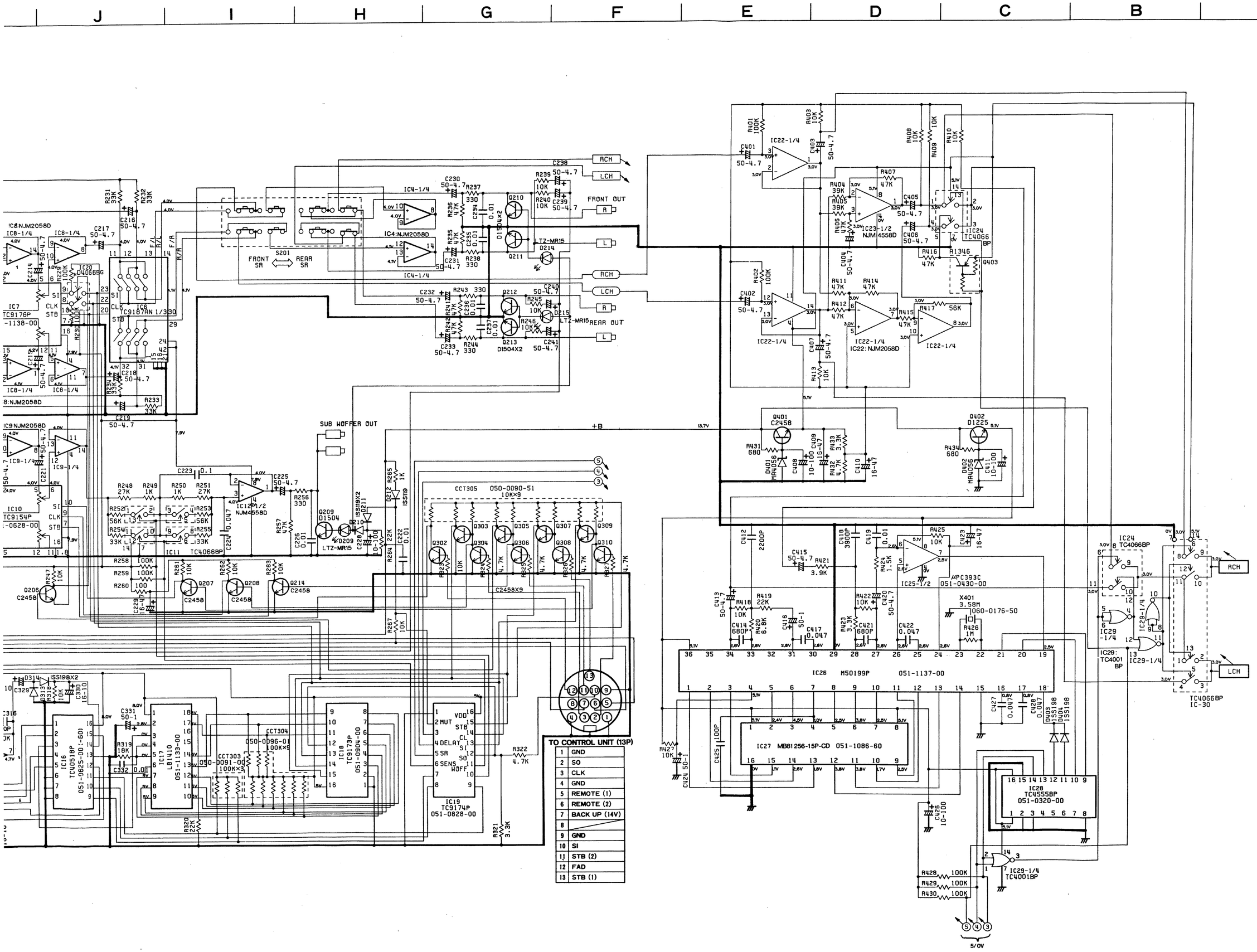
IC23 NJM4558D
IC22 NJM2058D
IC5 7EL-GE-EVOL
IC9 NJM2058D
IC10 TC9154P
IC24 TC4066BP
IC30 TC4066BP
IC29 TC4001BP
IC28 TC4555BP
IC11 TC4066BP
IC12 NJM4558D
IC6 TC9187AN
IC8 NJM2058D
IC7 TC9176P
IC13 NJM4558D
IC15 NJM2058D
IC14 NJM2058D
IC16 TC4051BP
IC20 μPD4066BG
IC17 LB1410
IC25 μPC393C
IC21 TA7424AP
IC4 NJM2058D
IC19 TC9174P
IC18 TC9173P
IC26 M50199P
IC27 MB81256-15P-CD
S201
REAR SR ↔ FRONT SR
X401 3.58M
854-0790-00
854-0791-00
854-0789-00
850-2492-00
REMOTE OUT
L201
1A
850-2495-01
120-0010-00
850-2496-00
BACK UP
840-0345-02
GND
850-2491-00
REMOTE IN
CASE
SUB WOOFER OUT
R
L
REAR CH. OUT
FRONT CH. OUT
INPUT
TO CONTROL UNIT (13P)
PINK
LIGHT BLU
GRY
YEL
PUR
ORG
RED
BLU
BRN
GRN
WHT
BLK
LIGHT GRN

1	GND
2	SO
3	CLK
4	GND
5	REMOTE (1)
6	REMOTE (2)
7	BACK UP (14V)
8	
9	GND
10	SI
11	STB (2)
12	FAD
13	STB (1)

■CIRCUIT DIAGRAM:

◎BLACK BOX UNIT SECTION




IC8:NJM2058D
IC9:NJM2058D
IC7 TC9176P -1138-00
IC10 TC9154P -0628-00
IC6 TC9187AN 1/330
IC11 TC4066BP
IC4:NJM2058D
IC20 D4066BG
S201 FRONT SR ⟺ REAR SR
SUB WOOFER OUT
+B
RCH
LCH
FRONT OUT
REAR OUT
Q210 D1504X2
Q211 LTZ-MR15
Q212 D1504X2
Q213 D1504X2
Q214 C2458
Q207 C2458
Q208 C2458
Q206 C2458
Q209 D1504
Q210 LTZ-MR15
D211 ISS119X2
C2458X9
CCT305 050-0090-51 10K×9
CCT304 050-0096-01 100K×9
CCT303 050-0091-00 100K×3
IC16 TC40518P 051-0625-00(-60)
IC17 LB1410 051-1133-00
IC18 TC9173P 051-0904-00
IC19 TC9174P 051-0828-00
IC12 1/2 NJM4558D
IC22-1/4
IC22:NJM2058D
IC23-1/2 NJM4558D
IC24 TC4066
IC25-1/2 μPC393C 051-0430-00
IC26 M50199P 051-1137-00
IC27 MB81256-15P-CD 051-1086-60
IC28 TC4555BP 051-0320-00
IC29-1/4 TC4001BP
IC29: TC4001 BP
IC24 TC4066BP IC-30
Q401 C2458
Q402 D1225
Q403 A1346
X401 3.58M 1060-0176-50
TO CONTROL UNIT (13P)
1 GND
2 SO
3 CLK
4 GND
5 REMOTE (1)
6 REMOTE (2)
7 BACK UP (14V)
8
9 GND
10 SI
11 STB (2)
12 FAD
13 STB (1)
5/0V